

**FEDERAL FINANCING OF RESEARCH AND DEVELOPMENT
AND THE REGIONAL DISTRIBUTION OF INCOME**

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A previous study by the author¹ analyzed the geographic allocation of various categories of Federal Government expenditures in relation to the regional distribution of income in the United States. The present report uses the methodology developed in that study to analyze the extent to which three major research and development (R&D) agencies act as regional income equalizers: the Department of Defense, the National Aeronautics and Space Administration (NASA) and the National Science Foundation (NSF).

For purposes of analysis, the 50 states have been aggregated into the eight income regions used by the U.S. Department of Commerce in computing regional income data. Regions were ranked in terms of average per capita incomes reported for 1964. The results are shown below and indicate the substantial regional variations; the average for the highest region, the Far West, was 56 percent above that for the lowest, the Southeast.

<u>Region</u>	<u>Average Per Capita Income 1964</u>
Far West (California, Washington, Oregon)	\$2,995
Mideast (New York, New Jersey, Pennsylvania)	2,965
New England (from Maine to Connecticut)	2,866
Great Lakes (Ohio, Illinois, Michigan, Wisconsin)	2,750
Plains (Kansas, Nebraska, Iowa, Missouri)	2,399
Rocky Mountains (Colorado, Wyoming, Utah)	2,343
Southwest (Texas, Arizona, Oklahoma, New Mexico)	2,166
Southeast (from Virginia to Louisiana)	1,917

Source: Office of Business Economics, U.S. Department of Commerce.

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The eight regions can be further grouped into high, average, and low income categories. The following criteria for assigning the regions were used: (1) the high income regions have substantially greater percentages of total personal income in the United States than of national population, (2) the average income regions have approximately the same shares of personal income as of population, and (3) the low income regions have substantially smaller percentages of personal income than of population.

By the criteria, we can distinguish two high income regions, four average income regions, and two low income regions as follows:

Table 1

REGIONAL DISTRIBUTION OF POPULATION AND INCOME, 1964

<u>Region</u>	<u>Share of National Population</u>	<u>Share of Personal Income</u>
<u>High Income</u>	<u>34.0</u>	<u>39.4</u>
Far West	12.7	14.8
Mideast	21.3	24.6
<u>Average Income</u>	<u>36.1</u>	<u>37.5</u>
New England	5.8	6.5
Great Lakes	19.7	21.1
Plains	8.2	7.7
Rocky Mountains	2.4	2.2
<u>Low Income</u>	<u>29.9</u>	<u>23.1</u>
Southwest	8.1	6.8
Southeast	21.8	16.3

Source: Survey of Current Business, July 1965; U.S. Bureau of the Census, Current Population Reports, Population Estimates, Series P. 25, No. 301, 1965.

Analysis of Research and Development Programs

As a simple method of seeing the differential effects on high, average, and low income regions, it is desirable to compare relative proportions of the three R&D programs going to a region with that region's share of total population and personal income. This has been done in Table 2, in terms of obligations incurred during the fiscal year 1964, and the results are revealing.

Table 2

REGIONAL DISTRIBUTION OF POPULATION, INCOME, AND FEDERAL FINANCING OF RESEARCH AND DEVELOPMENT IN FISCAL YEAR 1964

Percentage Distribution

<u>Region</u>	<u>Population</u>	<u>Personal Income</u>	<u>Research and Development</u>		
			<u>Defense</u>	<u>NASA</u>	<u>NSF</u>
<u>High Income</u>	<u>34.0</u>	<u>39.4</u>	<u>65.5</u>	<u>61.2</u>	<u>44.9</u>
Far West	12.7	14.8	38.0	47.6	14.8
Mideast	21.3	24.6	27.5	13.6	30.1
<u>Average Income</u>	<u>36.1</u>	<u>37.5</u>	<u>19.3</u>	<u>13.4</u>	<u>38.2</u>
New England	5.8	6.5	7.2	1.9	13.0
Great Lakes	19.7	21.1	6.2	3.4	15.8
Plains	8.2	7.7	1.7	7.8	4.3
Rocky Mountains	2.4	2.2	4.2	0.3	5.1
<u>Low Incomes</u>	<u>29.9</u>	<u>23.1</u>	<u>15.2</u>	<u>25.4</u>	<u>16.9</u>
Southwest	8.1	6.8	7.9	6.6	10.1
Southeast	<u>21.8</u>	<u>16.3</u>	<u>7.3</u>	<u>18.8</u>	<u>6.8</u>
Grand Total	100.0	100.0	100.0	100.0	100.0

Source: Bureau of the Census, Population Estimates, Series P. 25, #301; Survey of Current Business, July 1965; Obligations for Research and Development, and R&D Plant, by Geographic Divisions and States, By Selected Federal Agencies, Fiscal Years 1961-1964, Report to the Subcommittee on Science, Research and Development, 88th Congress, 2nd Session, September 1964.

In the case of the Southeast--the lowest region in terms of per capita income--the share of NASA prime contracts is somewhat below its share of national population, but slightly above the proportion of personal income. However, the Southeast receives much smaller shares of Defense and NSF research and development funds than would result from a simple geographic distribution on the basis of either population or income.²

For the Southwest, the pattern is quite mixed, with an above-average share of NSF funds, a below-average share of NASA funds, and an allocation of Defense R&D which is lower than the population proportion but higher than the income proportion. For the two low-income regions taken together, Defense and NSF provides shares of R&D expenditures below both population and income, while for NASA the shares are below the population importance but above the income allocations.

In the case of the two high-income regions taken as a whole all three Federal R&D programs provide funds substantially higher than their shares of national population or income. However, the pattern is not so uniform when the data for the individual regions are examined. Defense and NASA provide substantially above-average shares to the Far West, while NSF outlays correspond more closely to the income and population distribution. For the Mideast, Defense and NSF both provide above-average shares while the NASA allocation results in a below-average share.

When the four average-income regions are taken as a whole, it can be seen that Defense and NASA provide shares of R&D funds substantially below allocations that would be based either on population or income while the NSF distribution approximates far more closely the composite share of population and income. As can be seen in Table 2, there are numerous variations for the individual regions in this category.

Some Comparisons

The earlier study indicated that, in general, the traditional civilian expenditures of the Federal Government tend to act as income equalizers among the different regions of the United States and that defense/space programs do not.

The overall results of this study are somewhat similar. It does appear that none of the major R&D programs serve as regional income equalizers. However, there is no standard pattern emerging from the analysis which satisfactorily covers each of the three R&D programs. One attempt at ranking the three programs is through computing their Gini coefficients, which are measures of relative equality. A coefficient of zero would indicate complete neutrality vis-à-vis the regional distribution of personal income. ¹³

As shown below, Defense Department R&D contract awards have the highest Gini coefficient, that is, this program has the greatest tendency to widen per capita regional income variations; in contrast, NSF allocations come closest to neutrality of the three programs, with NASA occupying a middle position.

RANKING OF FEDERAL R&D PROGRAMS, 1964

<u>Program</u>	<u>Gini Coefficient</u>
Defense R&D	+ .383
NASA R&D	+ .288
NSF	+ .190

Table 3

DATA ON FEDERAL OBLIGATIONS FOR R&D,
Fiscal Year 1964
(In thousands)

<u>Region</u>	<u>Defense</u>	<u>NASA</u>	<u>NSF</u>
<u>High Income</u>			
Far West	\$2,762,301	\$2,054,933	\$ 24,395
Mideast	1,998,536	584,995	49,545
<u>Average Income</u>			
New England	520,088	82,933	21,410
Great Lakes	452,143	147,480	25,877
Plains	125,654	337,720	7,070
Rocky Mountains	304,149	12,354	8,462
<u>Low Income</u>			
Southwest	576,358	283,115	16,533
Southeast	<u>529,858</u>	<u>813,247</u>	<u>11,222</u>
TOTAL	\$7,269,087	\$4,316,777	\$164,514

Source: Obligations for Research and Development and R&D Plant, by Geographic Divisions and States, By Selected Federal Agencies, Fiscal Years 1961-1964, Report to the Subcommittee on Science, Research and Development, 88th Congress, 2nd Session, September, 1964.

Footnotes

M.L. Weidenbaum, Shifting the Composition of Government Spending: Implications for the Regional Distribution of Income, Washington University, Department of Economics, Working Paper 6520, November 14, 1965.

12

For limitations of the Defense and NASA data on prime contract awards, see ibid., pp. 9-15.

13

For discussion of relative measures of equality of income distributions, see ibid., pp. 5-7; Mary Jean Bowman, "A Graphical Analysis of Personal Income Distribution in the United States," American Economic Review, September 1945.